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Teachers' Perspectives on Social Robots in Education: An Exploratory Case Study

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ABSTRACT
Research has shown that social robots carry potential to be used in an educational setting. The possibility to have multiple roles carried out by one tool does not only instigate curiosity but also raises concerns. Whereas practical challenges get tackled by rapid technological advances, the moral challenges often get overlooked. In this study, we examined the moral values related to educational robots from a teachers' perspective, by first identifying concerns and opportunities, and subsequently linking them to (moral) values. We conducted focus group sessions with teachers to explore their perceptions regarding concerns and opportunities related to educational robots. Teachers voiced several considerations ranging from having concerns towards privacy to seeing opportunities in adding friendship and attachment a robot could emanate.

Author Keywords
social robots; education; ethics; human–robot interaction

CSS Concepts
• **Social and professional topics → Codes of ethics**

INTRODUCTION
Robots have been used in education for decades, starting with Papet's Turtle robot in the early 1970's [17]. Robots were first mainly used for science, technology, engineering and mathematics (STEM) education. Recently, a new type of robot has become increasingly common in the educational domain, in both regular as well as special education (e.g. education for children with Autism Spectrum Disorder), namely the social robot [6,12,16]. Whereas other types of educational robots are mainly used for STEM education and as tools for teaching programming skills (e.g., Lego Mindstorms), the social robot is used to teach children through social interaction [4]. Social robots can take on different roles such as that of a tutor or peer and are often equipped with human- or animal-like features such as eyes, gestures, sounds, and speech technology. Keepon and Dragonbot, which are both animal-like, and NAO, Wakamaru, and Robovie, which are human-like robots, are examples of social robots used in education.

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Social robots could have great potential for education and research thus far indicates they can increase learning performance and learning results of children [2,4,13,15,23].

Although social robots could provide new possibilities for education, several studies report on moral challenges [19,20]. Values such as privacy, human contact and accountability are reported to be impacted by the social robots [19]. Hence, the urgency for further research into the moral considerations regarding educational robots is voiced throughout the robotic literature [3,9,19,21]. The aim of this exploratory study is to explore teachers' perspectives regarding the moral concerns that come with social robots in education. Teachers play an integral role in how children learn using devices in class and perceive information, making them key players within technological implementation, such as these social robots [5]. In addition, teachers will interact directly with educational robots in their line of work. Therefore, the moral perceptions of teachers should be considered while building, designing and implementing social robots for education

In this study, we present the results of several focus group sessions on teachers' implications regarding social robots in education. In the following, we present related research and our sampling method, followed by the methodology used to identify the teachers' perspectives on social robots in education. Subsequently, we present the results, the discussion and the conclusion.

BACKGROUND
There is some are extant literature that focuses on the perceptions of teachers regarding social robots in education [1,7,18,19]. Most of these studies give a broad view of the perspectives of teachers and highlight a few moral issues on the topic of educational robots. Serholt et al. [19] conducted focus group sessions with teachers from three different countries, discussing privacy, accountability, the role of the robot and the effects on children. In their study, they explore the teachers' perspectives on robots in education, making them one of the few studies on ethical deliberation with empirical data regarding social robots in education. Teachers mentioned concerns of the possibility of extensive data collection, like face and voice recognition, and the robot being disruptive in the classroom. Furthermore, they mentioned issues such as robots not seeing the consequences of their actions, or the children becoming 'mechanical' because of the loss of human contact.

Recently, Smakman and Konijn [21] conducted a systematic review to identify the moral values which are impacted by social robots in education. They identified a total of 14 moral values which are (potentially) impacted, both positively and negatively, by social robots. Values that were positively impacted included: psychological welfare, happiness, applicability, freedom from bias and usability. However, there were more values that were negatively affected. These values include values such as friendship, attachment, human contact, deception, trust, privacy, security, safety and accountability.

METHOD

We conducted focus group sessions with a total of 18 teachers spread across primary schools in The Netherlands, with 10 female teachers and 8 male teachers (M-age = 40.1; SD = 11.6; age range 26-59). All participants provided active, verbal consent for participating in this study. Classes in The Netherlands are usually divided by age and sometimes by development or ability. Primary schools in The Netherlands have 8 levels or grades, divided by the so-called junior, middle and senior sections [8]. In the sample, there were 5 junior section teachers (F=4, M=1), 8 middle section teachers (F=4, M=4) and 4 senior section teachers (F=2, M=2). One teacher was not part of a section, currently teaching in vocational education, but took the perspective of a primary school teacher. Experience in primary education varied from just one year being a primary teacher to 37 years. Experience with robots among the teachers varied with 12 teachers not having any experience and only a few teachers having worked with smaller robots, such as Bee-bots, Bomberbots, Dash & Dot and LEGO Mindstorms.

Topics for Focus Group Sessions

As a basis for the discussion in the focus group sessions, we used the 14 moral values related to the possible implementation of social robots in education [21]. Some values were combined to form a combined topic, such as 'privacy & security' and 'psychological welfare & happiness' because these seem closely related. The 14 values (some merged) to be discussed were: 1) privacy & security; 2) applicability; 3) psychological welfare & happiness; 4) usability; 5) accountability; 6) human contact; 7) trust & deception; 8) friendship & attachment; 9) freedom from bias and 10) safety. We added an extra category, named miscellaneous, for considerations that could not be (fully) identified to be placed under a specific value. Table 1 shows all 14 values (some merged), including the miscellaneous category, with examples in the context of educational robots.

Value	*Example*
Privacy & Security	Unauthorised or secondary use of data, ability to record the behaviour of children and move in the same physical space.
Applicability	Improve learning, help with doing homework, technology being inadequate.
Psychological Welfare & Happiness	Calming a child, personalised social supportive behaviour, Uncanny Valley effect, fear.
Usability	Beyond the classroom learning, providing access to resources not available before.
Accountability	Responsibility for software, responsibility for safety, responsibility for costs.
Human Contact	Child preferring the companionship of a robot over that of their human peers, a robot creating new social interactions.
Trust & Deception	A child might imagine that the robot really cares about them, a robot being able to listen to a child.
Friendship & Attachment	Becoming emotionally attached to a robot, a robot forming a relationship with a child.
Freedom from Bias	Creating a learning environment which is tailored to children's unique learning styles.
Safety	Fear of a robot hitting a child, loose or exposed mechanical parts on a robot.
Miscellaneous	Considerations or conflicts between two or multiple values.

Table 1. Values related to social robots in education

Procedure

To identify the perspectives of teachers on all 14 values we discussed them in focus group sessions. In total, we conducted three focus group sessions, consisting of six participants per group.

Teachers' experience with robots influences their perceptions of robots [14]. Therefore, in order to familiarize all participants with social robots, we started off the sessions with a short, neutral presentation in which terms like 'social robots' and 'moral values' were explained. After that, a five-minute video clip was displayed, presenting several educational robots in educational practice, covering subjects like language, math, and memory recall. After the video clip, a humanoid NAO robot [22] was physically present and introduced to the group. The NAO was programmed to introduce itself, followed by a dance and a math game for demonstrational purposes and to stimulate discussion. After this introduction, the NAO robot remained in rest-position on the table.

Following the introduction, the actual discussion took place in which participants discussed with each other on the opportunities and concerns of social robots. Participants were motivated to write down these findings on post-it notes, both for their own thought as to be compared with other participants.

All sessions lasted for approximately two hours and were recorded via microphones and a video camera (for which consent was also provided). The audio recordings have been fully transcribed. The camera was there to make it easier to identify speakers while transcribing. The names of the participants have been anonymized due to privacy reasons. All quotes derived from transcriptions have been translated from Dutch to English.

Data Analysis

All considerations expressed by the participants were categorized into each of the 14 values or the miscellaneous section (Table 1). Among the total of moral values, the top

four most discussed categories of values were further analysed: Privacy & Security, Applicability, Psychological Welfare & Happiness, and Usability. To present an in-depth insight into these four categories of moral values, we combined what specifically concerned the participants, and what they valued. For the remaining values (i.e., not in the top-four), a short summary of the general view is combined with quotes in the following presentation of results.

RESULTS

In this section, we present the findings from the focus group sessions sorted by challenges and opportunities. When a quote is given, a referral to the speaker is anonymized via an abbreviation in the form of T (for teacher) followed by a number, for example, T13.

Challenges

Privacy & Security

Privacy & Security were the most recurring values. Educational robots contain hardware and software like cameras which allow them to collect variations of data, like video, audio and results from exercises done with the robot. Some teachers were anxious about the use of data collected by the robot. They saw increased privacy regulations as an obstacle, with *"We can't do anything without permission"* (T3) as a shared opinion among many. Teachers argued that parents always have the right to get insight into the data collected. However, they also agreed that the data should be checked by the school or teachers first. As one teacher mentioned, *"To avoid problems, I think it would be useful if I, as a teacher, can see the data first before it reaches the parents"* (T3). The same teacher continued, *"Parents checking, fine. But for some information, I would like it if I can discuss it with parents first, so that parents don't blame teachers for certain things like why a teacher hasn't talked with a pupil about something. I would cover up myself for that"* (T3). Another teacher agreed and added, *"Parents have the right to check everything. But you don't have to do that straight away. You can also say, 'come back later'. I think you should think this through as a school, not just say 'all right, here is the data'"* (T4).

Teachers also saw privacy as an issue when the robot interacts with multiple children. One teacher expressed, *"Picture this, the robot is working in a small group of children, then you have the following problem: the privacy of another child. That's not allowed either, because you can't just try that …"* (T4). Teachers were also concerned with parents wanting to have all the data collected by the robot. One teacher explained, *"Parents are very clear: we want to be able to have insight into everything that's being recorded. But we can't guarantee that. How?"* (T6). In terms of the data being used by third parties such as educational publishers or recipient schools, teachers generally agreed with the opinion of *"as long as it [the data] is fully anonymized, then it's possible"* (T5).

Applicability

As a second most discussed topic, teachers expressed split opinions on the applicability of educational robots, specifically the level of education the robots can offer. One teacher explained, *"I would like to see the added value when, for example, in a math exercise the solving strategy would emerge. The child produces an answer, but how did it get to the answer?"* (T1). This concern was mentioned by several teachers, arguing the robot would not be able to teach the deeper levels of education. Teachers referred to the deeper levels as not only giving the solution to an exercise, but more importantly, insight into how this solution was achieved. Many teachers argued that these deeper levels are one of the most important subjects in education. The lack to teach this was often paired with the issue of data usage and time. As one teacher stated, *"The fact that I would really need those [video]fragments to make a right/wrong analysis … Then, I think I won't be needing an entire film to watch the practice of math exercises again. It could be valuable, but there's just no time"* (T9).

Another oftenly discussed issue issue was the role of the robot. Several teachers mentioned not knowing what role they would give to the robot in the classroom. On the suggestion of a robot serving as an administrative tool, one teacher said, *"Right now, I have to fill in an extensive digital form of each pupil. It contains so much; it even has psychological reports. I have to upload that, a social security number, everything. I don't know if it [a robot] really adds something"* (T1). Teachers explained that the lack of seeing the added value that a robot could bring to the classroom made it particularly hard to find a suitable role. One teacher noted, *"Here as well I think, what does it add? It's fun to look at it as a human, but can it actually do more?"* (T11).

The trouble of assigning a role to the robot was not only due to the lack of added value, but also repeatedly mentioned in collaboration with the (deficiency of the) robot's technology. As one teacher said, *"Right now we are assuming that this thing [the robot] always works and nothing goes wrong. I think it's a big leap, I would like to know more about that"* (T11). Teachers also addressed being anxious about the technology not working as it should, or not understanding how to use it.

Psychological Welfare & Happiness

Working with robots, especially at younger ages, was met with mixed reactions. One teacher said, *"I think the robot is very reliable, it always responds in the same way. Always neutral. But with young kids, we learn how to work with emotions."* (T8). The consistency of the robot was also seen as a concern by possibly putting the child in a negative rut. As one teacher explained, *"Plus the fact that the child shouldn't constantly get that negative experience when it goes wrong"* (T3). The teachers feared that the robot would not be able to differentiate between answers, with good being good and bad being bad.

The novelty effect was considered both positively and negatively. The novelty effect was a concern for one teacher, saying *"What I ask myself, right now it's all very new. And if it's new, they [the children] like it. But will habituation occur?"* (T1).

Usability

The teachers considered the robot as a possible tool for learning beyond the classroom, specifically to be taken home. When asked if a robot could be brought home by the pupils, teachers expressed strong opinions: *"It's too expensive. We don't let them take laptops home either"* (T4) was a shared opinion. Not only the costs were an obstacle, but privacy played a substantial role as well. As one teacher expressed, *"Well, I would have parents who would have problems [taking the robot home], considering the privacy law"* (T9). Teachers also emphasized the fact that the robot is not plug-and-play. One teacher said, *"I think in practice you will always have people within your team who just can't work with it or will"* (T9). Some teachers suggested workshops for working with the robot, increasing overall experience and knowledge among teachers.

When asked whether every child has the right to work with a robot, teachers unanimously agreed that this should be the case. However, age played a large role in this decision. A teacher said, *"No, they [children] all have as much right. But of course, you know from your own experience that if I would put one of those things [robots] at home, then I would let my 5-year-old play with it without worrying. But my 3-year-old? Hm, less! Not because he has less right, but because I prefer to keep the device [the robot] alive for a longer amount of time"* (T6).

Some teachers also expressed worries towards the deployment of the robot. Not only occurred the issue of finding a suitable role for the robot, but spreading out the content that the robot provides was considered an obstacle. As one teacher mentioned, *"Picture this, I have a robot. I have roughly 30 children in my class. Are only the strong, the weak or the average children allowed to work with it? Or is everyone allowed to work with it once per 4 weeks and maybe 10 minutes at a time? How are you going to manage that?"* (T9). When suggested by another teacher to perhaps split the class with one half working with the robot and the other half not, another teacher expressed: *"Yes then you will get parallel classes, one class will work with it and the other one will not. You have to prevent that"* (T10).

Accountability

In response to the question who should be accountable for subjects like maintenance, purchase, software updates and security, most teachers agreed this should be the supplier or the school. However, when accountability was discussed in the context of inside the classroom, one teacher argued that teachers hold responsibility as well, particularly with the actual use, saying *"But the teacher [is responsible] as well, he works with it [the robot] of course. See, saying that the IT guy is responsible is easy, but if you have 10 teachers whom all work with it and they all say the IT guy [is responsible] …"* (T6). One teacher compared the accountability issue regarding robots with the current laptop use within their own school. *"The kids work with it [the laptops] and they have to put it back in the cabinet and plug in the right adapter cable, et cetera. It's one big mess. So, then you're balancing on that level a bit. But if you're talking about big maintenance and the programming [of the big maintenance], then I wouldn't let an individual teacher do that"* (T5), with several teachers agreeing. The teacher followed, *"Practical use, yes. That's what keeps you as a teacher accountable. You have to walk along with your class to the laptop cabinet to check if children are putting stuff back the right way"* (T5).

Human contact

In the context of educational robots, human contact was still favoured by teachers. Tablets and laptops in classrooms were described by teachers as objects that already reduce human contact and robots not being different: *"What I find worrying is that all digital things shift the communicational preference of children. At home, they're already playing with an iPad, a smartphone, they're doing all sorts of games and now they're going to spend a lot of time talking to a robot. Aren't we changing the communicational preference, and do you want them [the children] to talk more to robots than humans?"* (T3). Moreover, teachers argued that emotional development is something which can't be taught by a robot. One teacher explained, *"Building an actual relationship with a robot … I wonder how good that is for your own social skills. It responds differently. If I look at my [pupils'] age, grades 4/5, then I prefer them to play with each other rather than having them staring at a screen, because they don't have that interaction"* (T9). Teachers also emphasized children having trouble to separating reality from fiction, especially at a younger age: *"Then, where is the line between fiction and reality? For some children that's really hard [to understand]"* (T8).

Trust & Deception

Teachers showed concerns towards children forming a bond with a robot. A teacher mentioned, *"But what if you have a kid from grade 8 who's been through a lot and he tells it to a computer. I don't know if that child should know…[ ], that we can play back everything"* (T2). Teachers were anxious about the fact that children's trust could be damaged when they would find out that their data would be used without their knowledge. They did, however, see age as a defining factor. Saying that it's age-related, one teacher explained, *"I can imagine you wanting to introduce it [the robot] as a friend to toddlers. But if you're in class 4-5, I think you should make them a bit more conscious. Or maybe you can already tell it during the introduction"* (T2). On the topic of trust & deception, teachers also stated that you should be honest with the child in terms of data collection: *"A child should know that it [data collected by a robot] can be revisited"* (T4).

Friendship & Attachment

The topic friendship & attachment shares many similarities with trust & deception. The difference between the two, however, lies within trust & deception often being a result of friendship & attachment, according to the teachers. For example, having a bond with a certain person can create trust. Children are reported to project friendship or attachment onto social robots [4]. A toddler, for example, would envision a teddy bear to be a living friend. A robot like the NAO could, therefore, spark a similar feeling in a child as a teddy bear would because it has humanoid properties. A teacher expressed concerns when older children would form a bond with a robot: *"If you as 10-, 11-, 12-year-old are saying 'the*

robot is my friend', then I would find that somewhat worrying" (T3). Moreover, teachers agreed that children of older ages trusting a robot more and forming a relationship with it, would cause serious concerns. Another teacher added: *"If a child is going to see this [the robot] as solely a trustworthy thing, then there might be something more wrong"* (T3).

Freedom from bias

When freedom from bias was discussed, teachers considered the robot as a tool for easy math and language exercises. When more complex exercises were addressed, they argued that a robot would not be up for the job. Having limited responses, the robot would solely give a correct or wrong response, potentially demotivating the child. A teacher stated, *"If it's a student who has to work harder than others and is constantly being told 'wrong, wrong, wrong' by the robot, yeah, he's definitely going to fail"* (T3) with several teachers agreeing.

Safety

Safety was mostly discussed among teachers when a child or class would be left with a robot unsupervised. Being compared to laptop use in class, a teacher said, *"I frequently put children in the hall to work with a laptop or something, but I let them know that I know what they are doing. So, even if I would send them away with a robot, I would still say 'I know what you are doing' in advance"* (T10), with many teachers agreeing. Teachers explained they often have a good idea of whom they would leave unsupervised with the robot and who not: *"You know which child you will allow doing that [being alone with the robot]. You also know exactly which child you will absolutely not allow doing that"* (T5). When discussing the physical safety of children in presence of a robot, teachers did not seem very concerned. One teacher argued, *"No, it [the robot] is safe, isn't it? We have more unsafe toys at school than this"* (T3).

Miscellaneous

In this section, we discuss quotes from teachers which could not (fully) be identified as or placed under a specific value. These quotes often overlap with other values, showing similarities or conflict between them. One comment made by a teacher was, *"But keep in mind that the child knows that the robot will not judge or answer at all, which could be a free ticket to say whatever it [the child] wants"* (T3), showing concern towards freedom from bias as well as data usage. Other concerns were the combined matters of privacy, applicability and psychological welfare, in particular workload of the teacher. Following on the collection of video footage, a teacher noted, *"I can imagine that if you are going to revisit all the footage the robot records on one day … times 30 students or whatever …"* (T6). The same teacher continued, *"Because who is going to check all of that [the data collected by the robot], and when?"* (T6).

Opportunities

Privacy & Security

Teachers showed interest in the data collected by the social robot, with many seeing opportunities to use this hardware and software. In response to the question if the teachers would like to have the data collected by these robots, a teacher mentioned, *"yes of course [I would like the data], because it would give you a lot more information on what has happened"* (T6). Many teachers saw the use of data as a opportunity to enhance personalised learning. As one teacher expressed, *"I would like that [to use the data]. If a child makes a mistake, you could go through the data together. Like, where did you stall, how can you improve that. That's something positive, I think"* (T7).

Applicability

Teachers did see the robot being a prime tool for teaching programming to the students. With computational skills becoming increasingly important within education, a teacher stated: *"And if they get it taught at a very young age, then programming something like a website in grade 8 would almost be too easy"* (T7). One teacher also suggested that students from a senior section would be able to help students in lower sections with programming, saying, *"If you, as teacher, say to less motivated older students that they can work with that thing [the robot] a couple of times, that you give them the exercise to develop a small course. Then you are making a combination of implementing it with young children. I really see that as a very functional use"* (T18).

Psychological Welfare & Happiness

Not only increased learning gains and the effective use of the robot were deemed important. Teachers indicated that students would definitely enjoy working with a robot. As one teacher implied, *"If I would put it [the robot] in my class, with those from [grade] 5 and 6, well they would really enjoy that. Really!"* (T3). The overall excitement of working with a robot was also seen as an opportunity to spark new interests within the pupils. *"For a lot of them, there is a certain interest, who like programming or just like computers in general. Those might have a stronger connection or feeling with those kinds of exercises"* (T7) was an opinion agreed upon by many. The patience a robot has was also seen as something positive. One teacher proclaimed, *"I think it calls to children and motivates them to do something with that robot. The robot stays patient, it shows no emotions. As a teacher you can show like "come on". A robot doesn't have that, so that feels very safe and helping for some kids"* (T8).

The novelty effect was perceived as a strength for another teacher, mentioning *"That really holds its powers, a bit of motivation indeed, a bit of experience. All kids would want to work with that"* (T6).

Friendship & Attachment

The potential regarding friendship and attachment was considered as well. Specifically mentioning special needs children (e.g., in the Autistic Spectrum Disorder, ADHD, dyslexia) who could benefit from a relationship with a robot. Junior section teachers saw a connection with the hand dolls they use during class. One teacher said, *"And the hand dolls for toddlers, we give those magical powers too [to entertain the children]. Toddlers believe that, and I think you can do that with a robot as well. While playing, they're discovering things"* (T5).

DISCUSSION

Teachers shared many different opinions and discussed opportunities and concerns of social robots in primary education. Teachers saw opportunities in, for example, learning language and math, yet the concerns often outweighed the potential. Privacy & security were the most discussed moral values, followed closely by concerns regarding applicability, psychological welfare, and usability. We will first discuss our results which are consistent with prior research, followed by newly identified considerations which are not reported in existing literature.

Consistent with prior research

In terms of data storage, many similarities between our results and others were reported. Teachers agreed that data being stored by the robot is fine, as long as it is anonymized. Serholt et al. [19] also report this consideration in their research, with teachers also being accepting of data storage on the condition that it was anonymized.

Applicability proved to hold both opportunities and concerns, particularly matters such as the robot's technology and the role of the robot. Teachers saw opportunities in the consistency a robot offers, not showing emotion and not getting ill or tired, making it an adequate tool to execute repetitive tasks. This role as a repetitive task performer was also reported in other studies [1,7]. However, this consistency and lack of emotion were also considered to be a potential concern. A teacher noted that emotions are important during the early stages of primary education, with a robot not being able to fulfill this more high-profile task. This lack of emotions was seen as a concern by teachers in other research too [18,19]. Teachers were also divided on the workload a robot could add or reduce. Serholt et al. [18,19] reported in two studies that some teachers perceived educational robots to constitute an extra burden. This extra workload was confirmed by several teachers in our study, specifically saying that tasks such as revisiting the data collected by a robot would add workload. However, the potential of an educational robot replacing a teacher was quickly dismissed among the teachers, saying the robot was nowhere near eligible enough, which was also reported before [7]. Contrarily, Serholt et al. [19] reported that replacement was considered to be a fear among teachers.

A robot executing repetitive tasks was often seen as an opportunity for the child to enhance learning. Teachers described that children enjoy the patience a robot has been observed before [1,19]. Teachers saw the calming nature of a robot as an opportunity to use this as a motivator for children. Ahmad et al. [1] report teachers suggesting funny roles for the robot to execute, in order to motivate children and keeping them engaged during the learning process. However, some teachers also expressed that robots would not be able to comfort a child sufficiently, since a robot does not have emotions. This specific concern was reported in earlier research by a teacher, in research conducted by Diep et al. [7], arguing that educational robots could not provide the same amount of comfort or emotional readiness when students would be distressed.

The considerations regarding the ratio of robot to child in a class in our study are consistent with earlier research. Serholt et al. [18] reported that teachers state that finding the right balance regarding child/robot ratio was considered to be very challenging. This was also mentioned by the participants in our study, adding that big classes make it hard to picture a scenario in which every child gets to play with the robot for the same amount of time.

Newly identified considerations

Teachers did not only express concerns toward the use of data collected by the robot, but voiced advantages too. More specifically, some teachers in our study were enthusiastic by the thought of being able to use data such as face recognition, making the robot able to differentiate between children and recognising them, giving a comforting feel to the child by knowing its name. This opportunity has not been mentioned before in other research, with teachers only going as far as seeing possibilities to use the memory of the robot to recall certain things [1].

Another privacy-related concern which wasn't observed before, was the privacy guarantee of children not directly working with the robot. Privacy was often discussed in terms of data collection and protection [19], but the privacy of other children in the same room with the robot was overlooked by teachers in earlier research.

However, some teachers from the study of Serholt et al. [19], expressed concerns towards the initial storage of data. They mentioned having data like facial recognition and emotions being a big issue, and questioned if it was necessary to store such data at all. These concerns were not indicated by teachers from our study, with them only explaining that the use of these data would potentially add to the workload. These teachers also heavily implied that they should be able to check the data first before parents would get access to it. The fear that parents would not understand the data was a shared opinion, with some teachers also expressing the fear of being blamed by parents, for example, of not immediately helping a child. Other studies have not reported on this concern so far.

In related research, elements of usability have been discussed. The effects of topics such as a robot accompanying a student at home have been covered by other research before [10,11]. However, in our study, participants showed more concerns towards e.g. costs, saying the robot is too expensive to be taken home. Teachers unanimously agreed that everyone should have as equal rights to work with a social robot. This has not been reported in earlier research

CONCLUSION AND LIMITATIONS

In this exploratory study, we aimed to explore teachers' perspectives on the moral values related to social robots in education. The values privacy & security, psychological welfare & happiness, applicability and usability, were the most discussed values during the focus group sessions. This indicates that teachers consider these values most relevant or problematic when implementing social robots in education.

We note that the lack of experience the teachers had with (social) robots might have influenced the results, as teachers often had trouble picturing different scenarios in which a

robot like the NAO could be applied. A few teachers had experience with smaller robots like the Bee-bot, but mentioned that the NAO robot is in a different league. By showing a video clip and giving participants an interactive demonstration with a NAO robot, we hoped to shrink the gap between expectations and actual experience.

We also acknowledge that our exploratory study was solely executed within The Netherlands. With many countries using different educational methods and having access to different technologies, we want to stimulate researchers in doing similar research with teachers across the globe, exploring their opportunities and concerns to broaden the ethical considerations on social robots in education.

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SELECTION AND PARTICIPATION OF CHILDREN

No children participated in this work.

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